

16. A method according to Claim 15, including the step of providing within said chamber a porous material which is thermally conductive, and which is in contact with said heat absorbing material.

17. (Amended) A method according to Claim 14, wherein said step of distributing said heat so as to reduce temperature gradients is carried out using a plurality of heat pipes.

Amended
18. A method according to Claim 17, wherein said step of distributing said heat includes the steps of providing said housing with a plurality of ribs which are thermally conductive and each extend within said chamber, and providing a respective said heat pipe within each of said ribs.

REMARKS

Claims 1-4, 7, 13-14 and 17 have been amended, and Claims 19-26 have been added. Claims 1-26 are present in the application. Reconsideration of the application, as amended, is respectfully requested.

Noted with appreciation is the indication in the Office Action that Claims 7-12 recite allowable subject matter, and would be allowed if rewritten in independent form. Claim 7 depended from Claims 1 and 4, and Claim 7 has been amended so as to add to it the limitations of Claims 1 and 4, thereby placing Claim 7 in independent form. Claims 8-12 each depend directly or indirectly from Claim 7, and it is thus believed to be unnecessary to separately place them in independent form. Thus, Claims 7-12 should all now be in proper condition for allowance, and notice to that effect is respectfully requested.

New Claims 19-23 are new dependent claims, which each depend directly or indirectly from allowable Claim 7. Claims 19-23 should thus all be in proper condition for allowance, and notice to that effect is respectfully requested.

The Examiner attached to the Office Action an initialed copy of a previously-submitted Form PTO-1449. Page 2 of this PTO-1449 refers to European Reference No. 0 541 456 A1. In association with this document, the Examiner placed in the left margin of Form PTO-1449 a triangular symbol (Δ), and at the bottom of the form has repeated this symbol in association with an explanatory comment. The explanatory comment asserts that Applicants represented that this European reference is a direct translation of U.S. Patent No. 5,404,272. This assertion is respectfully traversed. In the Information Disclosure Statement previously filed on February 8, 2000, Applicants stated that they do not have access to an English translation of this European publication, but noted that it "corresponds to U.S. Patent No. 5,404,272". The disclosures of European Reference No. 0 541 456 A1 and U.S. Patent No. 5,404,272 are very similar, but Applicants have not represented that either is a direct translation of the other.

In the first paragraph on page 2 of the Office Action, the Examiner objects to the specification under 37 CFR §1.75(d)(1), noting that the term "heat absorbing material" is used in the claims, and asserting that this term does not appear in the specification. This ground of objection is respectfully traversed. In this regard, MPEP §2173.05(e) states that: "There is no requirement that the words in the claim must match those used in the specification disclosure". Thus, even if the exact term "heat absorbing material" does not appear in the specification, it would not be an automatic

ground for objection. In the embodiment disclosed in the present application, the material which absorbs heat is a phase change material. The specification expressly states that "the phase change material absorbs heat", for example at lines 7-8 on page 16. In fact, the specification includes several similar statements, for example in the text at line 16 on page 14, from line 34 on page 15 to line 8 on page 16, and at lines 21-22 on page 16. Given the statement in the specification that this "material absorbs heat", it is respectfully submitted that this statement is more than sufficient to serve as a clear and proper antecedent basis for use of the term "heat absorbing material" in the claims. Therefore, Applicants respectfully traverse the assertion in the Office Action that the specification does not reasonably provide an appropriate antecedent basis for use in the claims of the term "heat absorbing material". (The discussion in this paragraph of the disclosed embodiment and certain text in the specification is not intended to limit in any way the scope of any claim, but is presented merely to demonstrate that the specification does indeed provide a proper antecedent basis for the claim terminology in question). It is respectfully requested that the objection to the specification be withdrawn, and Applicants request notice that this objection has been withdrawn.

The Office Action rejected independent Claim 1 under 35 U.S.C. §102 as anticipated by Faghri U.S. Patent No. 4,976,308. The foregoing amendments adjust Claim 1 so as to more clearly distinguish the subject matter of Claim 1 from the disclosure of the Faghri patent. In this regard, Claim 1 recites a housing having a chamber with a heat absorbing material therein. Claim 1 further recites that the housing has "an exterior surface through which heat can enter and leave said housing", and recites "a heat pipe disposed within

the material of said housing and operative to facilitate heat distribution within the material of said housing in a manner which reduces temperature gradients across said surface". In contrast, the arrangement disclosed in the Faghri patent is significantly different.

More specifically, Faghri discloses in Figures 2 and 3 a cylindrical housing 12 having in the interior thereof a chamber which contains a heat absorbing material 18 encased within a plurality of spherical containers 16. A plurality of heat pipes 22 extend radially, and each have one end disposed within the housing 12 and the other end disposed externally of the housing 12. The heat pipes transfer heat between a fluid 6 which surrounds the housing 12, and the phase change material 18 within the containers 16 inside the housing. The housing 12 is made of stainless steel, and it appears to be possible for some heat to enter and leave the housing 12 through the exterior surface of the housing 12. However, Faghri appears to teach that the majority of the heat which enters and leaves the housing 12 travels through the heat pipes 22. In this regard, it should be noted that the heat pipes 22 of Faghri function primarily to transfer heat between two regions respectively located inside and outside the housing 12, rather than to transfer heat within the material of the housing 12. The heat pipes 22 of Faghri are clearly not "disposed within the material of said housing and operative to facilitate heat distribution within the material of said housing in a manner which reduces temperature gradients across said surface", as required by Claim 1. It is therefore respectfully submitted that Claim 1, as amended, is not anticipated or rendered obvious by the Faghri patent, and notice to that effect is respectfully requested.

Independent Claim 14 was also rejected under §102 as anticipated by Faghri. Claim 14 has been amended to more

clearly identify the differences between Faghri and the subject matter recited in Claim 14. In this regard, Claim 14 is a method claim, which includes limitations comparable to the limitations from Claim 1 that have been discussed above. For example, Claim 14 includes a limitation reciting the step of "distributing said heat within the material of said housing, including the step of using a heat pipe disposed within the material of said housing to facilitate distribution of said heat in a manner which reduces temperature gradients across said surface". Claim 14 is therefore believed to be patentably distinct from the Faghri patent for the same basic reasons as Claim 1, and notice to that effect is respectfully requested.

Claims 2-6, 13 and 24-26 depend from Claim 1, and are also believed to be allowable over the art of record, for example for the same reasons discussed above with respect to Claim 1. Claims 15-18 depend from Claim 14, and are also believed to be allowable over the art of record, for example for the same reasons discussed above with respect to Claim 14.

Based on the foregoing, it respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any

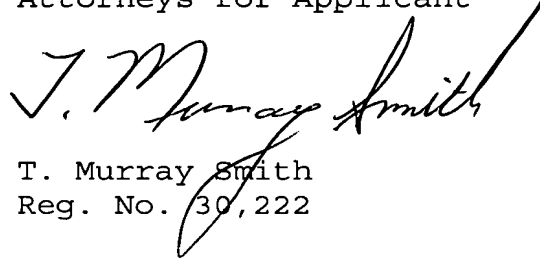
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way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at (214) 953-6684.

Respectfully submitted,
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Enclosures: Marked-Up Version of Claims
 showing Amendments
 Amendment Transmittal
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MARKED-UP VERSION OF CLAIMS SHOWING AMENDMENTS

7. (Amended) [An apparatus according to Claim 4,] An apparatus, comprising:

a housing having a chamber therein;

a heat absorbing material disposed within said chamber in said housing; and

a heat pipe disposed within said housing and operative to facilitate heat distribution within said heat absorbing material;

including a plurality of further heat pipes;

wherein said housing includes a plurality of thermally conductive ribs extending within said chamber and each having therein an opening;

wherein each said opening has therein a respective one of said heat pipes;

wherein said chamber includes a plurality of portions which are substantially separated from each other by said ribs, and

wherein said chamber includes a plurality of channels which are provided in said housing and which facilitate fluid communication between said portions of said chamber.

8. An apparatus according to Claim 7, wherein said housing includes a thermally conductive first part having a plurality of recesses provided in one side thereof, each said portion of said chamber being in a respective one of said recesses; wherein said ribs are portions of said first part which are disposed between said recesses; wherein said housing further includes a thermally conductive second part which is disposed against said one side of said first part; and

wherein said channels are each a transverse groove provided in a respective said rib on a side thereof adjacent said second part.

9. An apparatus according to Claim 7, wherein said ribs extend radially in respective different directions; wherein said openings in said ribs extend radially; and wherein said portions of said chamber are each sector-shaped, and are each disposed between a respective pair of said ribs.

10. An apparatus according Claim 7, including an expansion accumulator which is in fluid communication with said chamber, which receives a portion of said heat absorbing material from said chamber when said heat absorbing material expands in response to an increase in temperature, and which returns said portion of said heat absorbing material to said chamber when said heat absorbing material contracts in response to a decrease in temperature.

11. An apparatus according to Claim 7, including in each said portion of said chamber a thermally conductive member made of a porous material.

12. An apparatus according to Claim 11, wherein said housing and said thermally conductive members are all made of a metal, and wherein said thermally conductive members are each brazed to surfaces of said housing which define said chamber.

19. (New) An apparatus according to Claim 11, wherein said heat absorbing material is a phase change material.

20. (New) An apparatus according to Claim 7, including an antenna system which is coupled to said housing and which generates heat that is transferred to said housing.

21. (New) An apparatus according to Claim 7, wherein said heat absorbing material is a phase change material.

22. (New) An apparatus according to Claim 7, wherein each said opening has a first end which communicates through a passageway in said housing with a location external to said housing.

23. (New) An apparatus according to Claim 22, wherein each said opening has a second end which is remote from said first end and which opens outwardly through an outer surface of said housing.

1. (Amended) An apparatus, comprising:

a housing having a chamber therein, and having thereon an exterior surface through which heat can enter and leave said housing;

a heat absorbing material disposed within said chamber in said housing; and

a heat pipe disposed within the material of said housing and operative to facilitate heat distribution within the material of said [heat absorbing material] housing in a manner which reduces temperature gradients across said surface.

2. (Amended) An apparatus according to Claim 1, wherein said heat absorbing material is a phase change material.

3. (Amended) An apparatus according to Claim 1, wherein said housing has a thermally conductive portion with an opening therein, said opening being free of communication with said chamber, and wherein said heat pipe is disposed within said opening in said thermally conductive portion.

4. (Amended) An apparatus according to Claim 1, including a plurality of further heat pipes; wherein said housing includes a plurality of thermally conductive ribs extending within said chamber and each having therein an opening; and wherein each said opening has therein a respective one of said heat pipes, said further heat pipes each facilitating heat distribution within said housing in a manner which reduces temperature gradients across said surface.

5. An apparatus according to Claim 4, wherein each said opening has a first end which communicates through a passageway in said housing with a location external to said housing.

6. An apparatus according to Claim 5, wherein each said opening has a second end which is remote from said first end and which opens outwardly through an outer surface of said housing.

13. (Amended) An apparatus according to Claim 1, including an antenna system which [is coupled to] engages said surface on said housing and which generates heat that is transferred through said surface to said housing.

24. (New) An apparatus according to Claim 1, including in said chamber within said heat absorbing material a thermally conductive member made of a porous material.

25. (New) An apparatus according to Claim 24, wherein said housing and said thermally conductive member are made of a metal, and wherein said thermally conductive member is brazed to surfaces of said housing which define said chamber.

26. (New) An apparatus according to Claim 24, wherein said heat absorbing material is a phase change material.

14. (Amended) A method of cooling, comprising the steps of:

transferring heat to a housing [which has] through an exterior surface on said housing, said housing having therein a chamber that contains a heat absorbing material;

distributing said heat within the material of said [heat absorbing material] housing, including the step of using a heat pipe disposed within the material of said housing to facilitate distribution of said heat in a manner which reduces temperature gradients across said surface; and

causing said heat absorbing material to absorb said heat.

15. A method according to Claim 14, including the step of using a phase change material as said heat absorbing material.

16. A method according to Claim 15, including the step of providing within said chamber a porous material which is thermally conductive, and which is in contact with said heat absorbing material.

17. (Amended) A method according to Claim 14, wherein said step of distributing said heat so as to reduce temperature gradients is carried out using a plurality of heat pipes.

18. A method according to Claim 17, wherein said step of distributing said heat includes the steps of providing said housing with a plurality of ribs which are thermally conductive and each extend within said chamber, and providing a respective said heat pipe within each of said ribs.